

# Claims

- [c1] 1. A method for decoding disc information, comprising the steps of:
- receiving an original data signal and a clock signal;
- modulating the original data signal when a duration of the same status of the original data signal is less than a minimum transit period of the clock signal, so as to obtain a guaranteed-waveform data signal, wherein the duration of the same status of the guaranteed-waveform data signal is greater than the minimum transit period of the clock signal; and
- continuously decoding by using the guaranteed-waveform data signal and the clock signal, so as to obtain the disc information.
- [c2] 2. The method for decoding the disc information of claim 1, wherein the method for modulating the original data signal when the duration of the same status of the original data signal is less than the minimum transit period of the clock signal, so as to obtain the guaranteed-waveform data signal, comprises the steps of:
- generating a first reference data signal according to the original data signal, wherein the first reference data sig-

nal lags behind the original data signal, and the two signals differ by at least one reference lag period of the clock signal; further, a rising edge of the first reference data signal is generated fixed on a transit edge of the clock signal, and the duration of the same status of the first reference data signal is greater than or equal to the minimum transit period of the clock signal; delaying the first reference data signal so as to obtain a second reference data signal, wherein the two signals differ by one period of the clock signal; and if the duration of the same status of the original data signal is less than the minimum transit period of the clock signal and is caused by the original data signal being lagged behind the transit, the first reference data signal is used to generate the guaranteed-waveform data signal; otherwise, the second reference data signal is used to generate the guaranteed-waveform data signal.

- [c3] 3. The method for decoding the disc information of claim 2, wherein the method for determining whether the original data signal lags behind the transit or not, comprises the steps of:  
counting a number of the rising edge of the clock signal that appears in the duration of the same status of the original data signal according to a rising edge of the clock signal, so as to obtain a rising edge counting

value;

counting a number of the falling edge of the clock signal that appears in the duration of the same status of the original data signal according to a falling edge of the clock signal, so as to obtain a falling edge counting value; and

when the rising edge counting value is greater than the falling edge counting value, it is determined that the original data signal lags behind the transit.

[c4] 4. The method for decoding the disc information of claim 2, wherein the reference lag period is 1.5 period of the clock signal.

[c5] 5. The method for decoding the disc information of claim 2, wherein the transit edge is either a rising edge or a falling edge of the clock signal.

[c6] 6. The method for decoding the disc information of claim 1, wherein the minimum transit period is 3 periods of the clock signal.

[c7] 7. A method for decoding a disc information, comprising the steps of:  
receiving serial data;  
extracting 16-bit data from the serial data;  
encoding the 16-bit data so as to obtain 12-bit data;

converting the 12-bit data into 8-bit data by querying a modified decoding table; and  
outputting the 8-bit data;  
wherein, the modified decoding table has an abnormal 12-bit to 8-bit conversion information, and the 12-bit data of the abnormal 12-bit to 8-bit conversion information belonged to a portion received by querying the table are abnormal 12-bit data, and the abnormal 12-bit data are obtained by encoding an abnormal 16-bit data that violate an encoding rule of the disc information.

[c8] 8. The method for decoding the disc information of claim 7, wherein the abnormal 16-bit data, which violate the encoding rule of the disc information, are the number of the data "0" in its two contiguous data "1" is less than 2.

[c9] 9. The method for decoding the disc information of claim 7, wherein the step of receiving the serial data comprises the steps of:  
receiving an original data signal and a clock signal;  
modulating the original data signal when a duration of the same status of the original data signal is less than a minimum transit period of the clock signal, so as to obtain a guaranteed-waveform data signal, and the duration of the same status of the guaranteed-waveform data signal is greater than the minimum transit period of the

clock signal; and

obtaining the serial data by using the guaranteed-waveform data signal and the clock signal.

- [c10] 10. The method for decoding the disc information of claim 9, wherein the method for modulating the original data signal when the duration of the same status of the original data signal is less than the minimum transit period of the clock signal, so as to obtain the guaranteed-waveform data signal, comprises the steps of:
- generating a first reference data signal according to the original data signal, wherein the first reference data signal lags behind the original data signal, and the two signals differ by at least one reference lag period of the clock signal; further, a rising edge of the first reference data signal is generated fixed on a transit edge of the clock signal, and the duration of the same status of the first reference data signal is greater than or equal to the minimum transit period of the clock signal;
  - delaying the first reference data signal so as to obtain a second reference data signal, and the two signals differ by one period of the clock signal; and
  - if it is determined that the duration of the same status of the original data signal is less than the minimum transit period of the clock signal caused by the original data signal being lagged behind the transit, the first reference

data signal is used to generate the guaranteed-waveform data signal, otherwise, the second reference data signal is used to generate the guaranteed-waveform data signal.

- [c11] 11. The method for decoding the disc information of claim 10, wherein the method for determining whether the original data signal lags behind the transit or not, comprises the steps of:
- counting a number of the rising edge of the clock signal that appears in the duration of the same status of the original data signal according to a rising edge of the clock signal, so as to obtain a rising edge counting value;
  - counting a number of the falling edge of the clock signal that appears in the duration of the same status of the original data signal according to a falling edge of the clock signal, so as to obtain a falling edge counting value; and
  - when the rising edge counting value is greater than the falling edge counting value, it is determined that the original data signal lags behind the transit.

- [c12] 12. A method for decoding disc information, comprising the steps of:
- receiving serial data;
  - extracting 16-bit data from the serial data;

modulating the 16-bit data when the 16-bit data violate the encoding rule of the disc information;  
encoding the 16-bit data so as to obtain 12-bit data;  
converting the 12-bit data into a 8-bit data by querying a decoding table; and  
outputting the 8-bit data.

[c13] 13. The method for decoding the disc information of claim 12, wherein the abnormal 16-bit data, which violate the encoding rule of the disc information, are the number of the data "0" appears in its two contiguous data "1" is less than 2, and the modulating the 16-bit data means modifying the 16-bit data, so that the number of the data "0" in its two contiguous data "1" is equal to 2.

[c14] 14. The method for decoding the disc information of claim 12, wherein the step of receiving the serial data comprises the steps of:  
receiving an original data signal and a clock signal;  
modulating the original data signal when a duration of the same status of the original data signal is less than a minimum transit period of the clock signal, so as to obtain a guaranteed-waveform data signal, and the duration of the same status of the guaranteed-waveform data signal is greater than the minimum transit period of the clock signal; and

obtaining the serial data by using the guaranteed-waveform data signal and the clock signal.

- [c15] 15. The method for decoding the disc information of claim 14, wherein the method for modulating the original data signal when the duration of the same status of the original data signal is less than the minimum transit period of the clock signal, so as to obtain the guaranteed-waveform data signal, comprises the steps of: generating a first reference data signal according to the original data signal, wherein the first reference data signal lags behind the original data signal, and the two signals differ by at least one reference lag period of the clock signal; further, a rising edge of the first reference data signal is generated fixed on a transit edge of the clock signal, and the duration of the same status of the first reference data signal is greater than or equal to the minimum transit period of the clock signal; delaying the first reference data signal so as to obtain a second reference data signal, and the two signals differ by one period of the clock signal; and if the duration of the same status of the original data signal is less than the minimum transit period of the clock signal caused by the original data signal lagging behind the transit, the first reference data signal is used to generate the guaranteed-waveform data signal; oth-

erwise, the second reference data signal is used to generate the guaranteed-waveform data signal.

- [c16] 16. The method for decoding the disc information of claim 15, wherein the method for determining whether the original data signal lags behind the transit or not, comprises the steps of:
- counting the duration of the same status of the original data signal according to a rising edge of the clock signal, so as to obtain a rising edge counting value;
  - counting the duration of the same status of the original data signal according to a falling edge of the clock signal, so as to obtain a falling edge counting value; and
  - when the rising edge counting value is greater than the falling edge counting value, it is determined that the original data signal lags behind the transit.

- [c17] 17. A pre-treating circuit for accessing a disc, comprising:
- a waveform synthesizer, used to receive an original data signal and a clock signal, so as to generate a first reference data signal, wherein the first reference data signal lags behind the original data signal, and the two signals differ by at least one reference lag period of the clock signal; further, a rising edge of the first reference data signal is generated fixed on a transit edge of the clock signal, and the duration of the same status of the first

reference data signal is greater than or equal to a minimum transit period of the clock signal;

a delay unit, wherein the delay unit is coupled to the waveform synthesizer and used to delay the first reference data signal one period of the clock signal, so as to obtain a second reference data signal;

a lag determining & selecting circuit, used to determine whether the duration of the same status of the original data signal is less than the minimum transit period of the clock signal or not, and to determine whether it is caused by the original data signal being lagged behind the transit or not, so as to output a selecting signal; and

a delayed multiplexer, wherein the delayed multiplexer is coupled to the waveform synthesizer, the delay unit, and the lag determining & selecting circuit, and when the duration of the same status of the original data signal is less than the minimum transit period of the clock signal is caused by the original data signal being lagged behind the transit, the first reference data signal is selected to generate a guaranteed-waveform data signal according to the selecting signal, otherwise, the second reference data signal is selected to generate the guaranteed-waveform data signal.

- [c18] 18. The pre-treating circuit for accessing the disc of claim 17, wherein the lag determining & selecting circuit

comprises:

a rising edge counter, used to count a number of the rising edge of the clock signal that appears in the duration of the same status of the original data signal according to a rising edge of the clock signal, so as to obtain a rising edge counting value;

a falling edge counter, used to count a number of the rising edge of the clock signal that appears in the duration of the same status of the original data signal according to a falling edge of the clock signal, so as to obtain a falling edge counting value; and

a controlling circuit, wherein the controlling circuit is coupled to the rising edge counter and the falling edge counter and is used to output the selecting signal when it is determined that the rising edge counting value is greater than the falling edge counting value and determined that the original data signal lags behind the transit.